

What does it take to get a healthy diet at sea?

A maritime study of the challenges of promoting a healthy lifestyle at the workplace at sea

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ABSTRACT

Background and aim: Prevalence of obesity is high among Danish seafarers and appropriate health promotion interventions are required within the maritime setting. The aim of this study was to examine whether a training intervention for ship cooks could improve seafarers' diet on board and, in particular, to identify possible challenges in practice on board of vessels from 2 Danish shipping companies.

Materials and methods: Interviews and participant observations were conducted during a 2-day cooking course. Interviews were repeated 1 year after (N:35) the course in order to assess self-perceived changes in preparing meals and ordering supplies, as well as perceived challenges in implementing changes and maintaining them. In addition, changes in self-reported eating behaviour before the cooking course and 1 year after were assessed based on a 1-year follow-up quantitative questionnaire survey (N:193).

Results: Participants reported positive opinions about the course and subsequent changes in promoting a nutritious and healthy diet at sea by way of health education. Also a significant change was found in the seafarers' self-reported eating behaviour from T1 to T2. However several challenges were identified during the transfer and maintenance phase such as many cooks having received little or no prior training which limited their cooking abilities. Confined physical capacities on board, restricted space for storage and lack of proper equipment were other barriers and so were low frequency of supply options and high prices for fresh fruit and vegetables.

Conclusions: To fully realise the benefits of the changes, these challenges related to the specific maritime workplace setting need to be acknowledged and addressed at management level.

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Key words: health promotion, intervention, workplace, seafarers, lifestyle

INTRODUCTION

Globally we are faced with growing health challenges due to lifestyle risk factors such as obesity, smoking and physical inactivity increasing the risk of diseases like coronary heart diseases, type 2 diabetes and cancer. These diseases have become the dominant cause of death and disability, particularly in Western industrialised countries [1, 2]. However, there are huge differences in actual risk for subgroups of populations, defined, for instance, by socio-economic status, education, gender or cultural background [3]. A further important differentiating factor is type of work and

work place conditions, which vary immensely in terms of sedentariness, stress and opportunities to obtain healthy nutrition during working time [4].

One occupational group faced with specifically difficult conditions are seafarers. A look at risk factors among this occupational group reveals a striking picture. In a recent study from Denmark, for instance, the proportion of smokers and heavy smokers was approximately two thirds higher among seafarers than in the general population while the proportion of overweight and obese seafarers was more than twice as high as in the general population [5]. In fact, in this



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study, 75% of the seafaring study population were overweight (body mass index — BMI > 25) and of these 25% were obese (BMI > 30) [5]. Several other studies from different countries have similarly drawn particular attention to the high prevalence of obesity among seafarers [6–8]. Obesity in a work setting such as the maritime one poses many challenges, not only to long-term health but also to safety, such as in the case of emergency procedures and accidents.

Reasons for this high risk-factor load among seafarers are many. Work on board modern vessels has in recent years become largely sedentary [9]. Northern/Western seafaring crews often are still defined by a traditional male culture, which favours high-fat, high-salt, meat-oriented nutrition with lower proportions of vegetables or fruit [10]. Work at sea is often compressed into longer periods away from home, with a continuous exchange of on-duty and off-duty periods. Work time is typically beyond 37 h per week and rarely less than 7 days a week. Due to the restricted opportunities to spend leisure time and to the separation from private social networks, boredom and feelings of isolation are common [10–13]. One of the few pleasures of the day is thus food. Three main meals plus snacks 2–3 times a day are usual, and overeating is a common phenomenon [5]. A Polish study from 1998 showed that calorie intake of seafarers and fishermen actually substantially exceeded the recommended daily level, which is in line with the obesity trends highlighted above [10]. A need for effective health promotion interventions targeting diet in seafarers thus seems apparent. A Finnish intervention study from 1996 offered education on healthier eating habits and a one-day course for seafarers and cooks from cruise ferries on preparing low-salt and low-fat meals. The results showed that meals were perceived as better and healthier at the intervention's follow-up, even though no changes were found in physiological measurements [14]. Also, from the few existing studies it is not clear which factors could facilitate or hinder the implementation of such health promotion intervention programmes.

The overall aim of the present study was to examine whether a training intervention for ship cooks could improve seafarers' diet on board and in particular to identify possible challenges for the implementation of such improvements in practice on board. The intervention consisted of a 2-day course on healthy cooking and was offered to all cooks in 2 Danish shipping companies. The following specific objectives were formulated for the cooking course: (1) to provide the opportunity to share knowledge and experiences among ship cooks; (2) to create awareness among ship cooks of the official recommendations for a healthy and nutritious diet and provide advice on how to provide such a diet; (3) to train cooks in the use of the cookbook "Food at sea", containing tasty, healthy recipes designed for the maritime setting [15] and (4) to create awareness among ship

cooks of communication strategies to promote a healthy diet among crews.

MATERIALS AND METHODS

The study was part of a comprehensive intervention study on seafarers' health and lifestyle behaviour [4, 5]. The present part of the study was primarily based on a qualitative approach in which interviews and participant observations were conducted during a 2-day cooking course. Interviews were repeated 1 year after the course in order to assess self-perceived changes in preparing meals and ordering supplies, as well as perceived challenges in implementing changes and maintaining them. In addition, changes in self-reported eating behaviour of the seafaring crews before the cooking course and 1 year after were assessed based on a 1-year follow-up quantitative questionnaire survey.

STUDY SAMPLE

A total of 49 cooks from 2 Danish shipping companies participated in the course. Sixteen participants were interviewed in 4 groups during the course and 35 people were interviewed individually by telephone approximately 1 year after their course. Respondents consisted of professional chefs ($n = 23$) and ship assistants with cooking responsibilities ($n = 26$). The latter were all from the same company, as the other company only had professional chefs employed, 9 of who were interviewed.

Participants of the cooking course were recruited from 2 Danish shipping companies. Company 1 was a cargo service company (CSC) which operated mainly in the North Atlantic between Aalborg in Denmark and Greenland's Disco Bay and had approximately 190 seafaring employees. The majority of the seafarers were nationals of Denmark and Greenland. The off-shore period was 4–8 weeks, followed by 4–8 weeks at home. The average crew size was 12–15 people. All cooks employed in CSC were professional chefs who had completed the mandatory 4-year training to become a cook, followed by a special ship's cook course and practical training on board a ship prior to their employment. A total of 12 chefs participated from CSC. In CSC, provision of meals was organised free of extra charges, that is the meals were included in the salary of the seafarers.

Company 2 was an offshore rescue and support vessel operator (R&S) which mainly sailed in and around the North Sea, where they circulated offshore installations keeping watch for accidents such as oil spills or "man overboard" incidents. R&S had approximately 440 employees, the vast majority of whom were nationals of Denmark or the Faroe islands. The off-shore period was 2–4 weeks, followed by 2–4 weeks off. The crew size varied from 6 to 12 people. The cooks employed in R&S were not all professional ma-

ritime cooks, as few of R&S's ships had crews of more than 10 people, which is the lower limit for requiring a trained cook on board, according to law [16]. Thirty-seven professional cooks and ship assistants with cooking responsibilities participated from R&S. In R&S, board wages were practiced as a supplement to the salary of the individual seafarer. Each month, the total food expenses of a given ship were divided equally between the crew members and if the expenses were below the amount of the board wages, the difference was paid out with the salary.

INTERVENTION: THE COOKING COURSE

The intervention consisted of a 2-day cooking course on healthy diet aimed at all chefs and crew members with cooking responsibilities from the 2 companies. The course took place on-shore at a geographical location situated between the 2 main offices of the participating companies, and the trainers were health consultants with knowledge of the maritime occupation. The first day was an introduction to healthy diet according to official Danish recommendations and how to improve nutritional value in everyday dishes in accordance with the recommendations. Participants were divided into groups and received a practical task of preparing recipes from the maritime cook book "Food at Sea" [15]. Day two was devoted to motivation and communication skills with the aim of implementing a nutritious diet on board the ships. Five courses were conducted during a period of 8 months between May 2008 and January 2009.

MEASUREMENT

Qualitative interviews

Four semistructured group interviews ($n = 16$) were conducted during 2 of the cooking courses. The aim of the interviews was to gather information about participants' opinions of the course, the tasks at hand and to discuss their cooking experiences at sea. One year after completion of the course, semi-structured telephone interviews were conducted with participants ($n = 35$) based on an interview guide containing questions about professional background, such as position, length of occupation and daily occupational tasks, followed by questions about the course content and any changes made in cooking practices during the last year. Participants were also questioned about challenges during the transfer and maintenance of training and about the support of crew and management in response to changes. All interviews were taped and transcribed.

Participant observation and field work

Participant observations were carried out during 2 of the cooking courses in order to gather information on the content of the programme, and to observe how they were

Table 1. Qualitative material

	Total no.
Semi-structured telephone interviews with chefs/untrained cooks	35
Semi-structured group interviews with chefs/untrained cooks	4
Field work:	
Cooking courses	2
On board ships	2

conducted and received by the participants. In addition, 2 field trips were conducted on ships from each company around the time of the cooking courses, with the opportunity to observe the options available and the challenges experienced in the galley, and also to interview the crew. Field notes and pictures from fieldwork on board 2 ships were part of the data production (Table 1).

STANDARDISED QUESTIONNAIRE

A standardised questionnaire covering questions on seafarers' self-perceived health, well-being, and health-related behaviours was sent out to all seagoing employees in the 2 shipping companies ($n = 630$) at the end of 2007 (T1), and a follow-up (T2) was carried out at the end of 2008 [4, 5, 17]. The response rate was 60% of T1 participants. In order to assess changes in general eating behaviour among the crew, one question was asked for frequency of eating healthily: "Do you eat healthily (green, coarse and lean)?" Response options were "5–7 days a week", "3–4 days a week", "1–2 days a week" and "less". For the purpose of data analysis, the response categories were merged into two groups: "3–7 days a week", "2 days a week or less".

Data analysis

A content analysis approach was used to interpret the qualitative data based partly on a manual content analysis and partly on the N-Vivo 9 software program. The N-Vivo 9 program allows many different types of data (including pictures and field notes) to be managed and coded according to themes (e.g. "workplace", "experience during the cooking course", "experiences at the follow-up", "challenges") and subthemes (e.g. "cook/untrained cook", "shared knowledge with colleagues", "implementation of methods", "food at sea", "board wages") relevant for the aim of the paper. However, not all information concerning these themes and subthemes were detected in the search options due to alternative phrasing by the respondents. To ensure all relevant information was included from the material, an additional manual content analysis was performed and these findings were added into N-vivo.

To determine changes in self-reported eating behaviours between the baseline and follow-up, McNemar tests were used, matching pairs of subjects between the 2 periods of time. The results are presented as McNemar p-values. $P < 0.05$ was considered statistically significant.

RESULTS

PARTICIPANT SATISFACTION WITH THE COOKING COURSE

The first aim of the cooking course was to provide the opportunity to share knowledge and experience with cooks from another company and with different qualifications. This attempt was perceived positively by all the respondents from R&S, and the general opinion is reflected in the quote below:

“The mixed group was obviously something you learned from, working with a professional chef. I thought it was the best that day.” (Untrained cook, R&S)

A majority of the chefs from CSC however, were surprised about the limited training of the untrained cooks in R&S, which was observed during 2 courses and shown in the following statements:

“I was very surprised. I was not aware that there were some seamen who ran around and had galley service a week at a time. It surprised me.” (Chef, CSC)

“We had to spend a lot of time explaining to them [the untrained cooks] what we were talking about. For me this included having to explain to a man the difference between beetroot and red cabbage.” (Chef, CSC)

For the chefs in CSC, the opportunity to meet up with colleagues from their own company was perceived as highly positive:

“They [the management level] should make sure to arrange more things like this where we are joined together somewhere and get to know each other and get inspiration from each other. We are by ourselves out there when we are working at sea and it’s rare that we get to talk to each other [the cooks], and it’s also rare that the ships meet in port and are together.” (Chef, CSC)

The second aim concerned the usefulness of the information provided by the health consultants. This information included the official recommendations for healthy and nutritious diet and tips on how to implement these guidelines in their daily cooking. The information was perceived as useful but was not really new to the chefs. Untrained cooks, however, tended to perceive the tips as new and useful but also difficult to fully understand. This tendency was observed during the courses and also reflected in the statements below from 2 untrained cooks:

“It was a bit difficult to follow the information when you are not a chef.” (Untrained cook, R&S)

“The course could have lasted 2 days more, so there was time to get more into the things with the diet. Half of us are ordinary seamen and when we cook, we peel 10 pounds of potatoes and make beef... We need to know how new things are done. We may only have experience from seeing how our mother did things. We are self-taught to stand in a galley. It’s something you have to do as ordinary seaman, it is not voluntary. You are frowned upon if you can’t cook on board a ship. But it would help with more training if the course was extended a couple of days.” (Untrained cook, R&S)

A third aim of the cooking course was to become familiar with the usage of the maritime cookbook “Food at Sea”. The interviews showed that all cooks from CSC were familiar with the cook book, having used it for inspiration and tried out different recipes. Most cooks in R&S, however, had little or no experience using the cookbook. They perceived the cookbook as difficult to understand, unsuitable for small crews, producing too fancy food and requiring too many ingredients which they did not have access to:

“...we might seek inspiration in it from time to time, but usually that’s not what we do. If we can’t remember how to do things we use ‘Miss Jensen’ (ABC cookbook [18]).” (Untrained cook, R&S)

The last aim of the cooking course was to create awareness of communication strategies in order to promote healthy diet on board the ships. The cooks, however, found difficulty in doing this task as they perceived factors like traditions, age and hierarchy to be barriers for a positive reception by the crew:

“They [seafarers] are quite difficult to convince. To convince some hardworking seafarers who are out in all kinds of weather for 12 hours daily, they are quite difficult to move. You may move them a little at a time, not too much and do not remove it all [the known dishes] at once, then they will protest. I know the people I work with very well; if introduced [healthy diet] a little at a time, then suddenly it will become a habit.” (Chef, CSC)

“Those below 35 years of age are always super excited about it [healthy diet] whereas those who are older have to be worked on a little. Some of them are okay and some are not okay with it and need more time to get the positive idea of things. But most are reasonably open to changes as long as you do not make it appear too healthy. It may very well be healthy, but it should not appear too obvious, as you will lose the older crew members.” (Chef, CSC)

“It can be difficult to change his [the captains] habits. If he has been accustomed to getting his salami once a day, you do not beat him on the head and tell him to eat more vegetables. ...It [changes] can be difficult in practice... It’s hard when you’re on a ship, as there is always an alpha male on board yelling his

Table 2. Perceived usefulness of the course in percentages of company and rank

	Company 1 (CSC) Chefs (n = 9)	Company 2 (R&S) Chefs (n = 6)	Untrained cooks (n = 20)
1. Knowledge sharing between the companies	67%	83%	100%
2. Course information provided	56%	67%	100%
3. Maritime cookbook "Food at Sea"	100%	67%	20%
4. Information on communication strategies to promote healthy diet on board	56%	33%	20%

head off... complaining, and this of course creates limitations in promoting the healthy diet... but if skipper is in favour, it's easier to make changes." (Untrained cook, R&S)

An overview of course participants' ratings of the course is shown in Table 2.

TRANSFER AND MAINTENANCE OF THE COOKING COURSE TRAINING: 1-YEAR FOLLOW-UP

Follow-up interviews in both companies revealed improvements in applying the knowledge from the course 1 year after. In particular, the trained and untrained cooks from R&S had served more vegetables and fruits, and applied fat and sugar reducing tips from the course:

"I changed some daily routines after the course e.g. that there are other things to life than crème. I have this printed on my forehead every time I find myself standing with the heavy crème. Sometimes it goes back in the fridge, and I use low fat milk instead. People say wauuu, lhhh and ohhhh anyway. There are several things from the course that I use... I think I can say that I use more vegetables now than before, also frozen." (Untrained cook, R&S)

"We have found out that if the fruit is cut into small delicious pieces, people take them. If they themselves have to fumble with it and peel it themselves, etc. they do not bother." (Untrained cook, R&S).

"...I have generally reduced fat in my cooking at sea and at home, and also sugar." (Untrained cook, R&S)

"We drink more low-fat milk now that we did before... and we buy whole grain buns instead of regular bread rolls." (Untrained cook, R&S)

"We have demolished sodas. Before, you could just go and take them. It's empty calories and we do not need it." (Untrained cook, R&S)

"Engaging myself with a recipe that I have no prior experience with, would not be something I would have done prior to the course, but since the course I have done this. I've gained more courage to try out new things like that." (Untrained cook, R&S)

Despite positive changes in the reduction of fat and sugar, the untrained cooks in R&S did not think they had

sufficient time on a daily basis to practice healthier cooking and thus improve their cooking skills, as reflected in the quote below:

"Here [R&S], we're not all trained chefs. We are on the deck, and at the same time we have the job in the galley [cooking]. I will say this, that if you are to practice this health trend then you can't go around doing work with the containers, sail in the [rescue] boats, and service other companies while at the same time having to cook. This is what you do in this company." (Untrained cook, R&S)

Challenges for the untrained cooks concerning the supply system were also highlighted, as they lacked sufficient experience with the system and did not have an overview of the necessary stocking of goods needed during a trip. This overview is important, as the frequency of supply delivery varies and storage space is limited. This was observed during the fieldwork in R&S and shown in the following statements:

"It's difficult for the unskilled cooks and it is equally difficult for many of the skippers, as they do not have a clue. They just send off the order and then it suddenly turns out that it is completely wrong what they deliver." (Chef, R&S)

"...this supply list that we order from, it's a bit messy. If you are not familiar with it, you can easily get into trouble." (Untrained cook, R&S)

"Small ships like ours, where we have 3 small chest freezers and 2 refrigerators, the space is limited. We can't keep fruits and vegetables fresh for long... those who do not get supplies every 14 days have a problem with getting enough fruits and vegetables." (Untrained cook, R&S)

Another challenge concerning the supplies was selection of products from the ordering catalogues. In the catalogues that were available to cooks, some products were not available or could only be ordered in quantities that were not suitable for a small crew:

"Sometimes I feel limited by the sea area in which I operate, in regards to practicing healthy living. For example, if I have to have vegetables from Denmark, then it has to be shipped up as goods to Greenland." (Cook, CSC)

Table 3. Eating behaviour at sea at T1 and T2

T1	T2			P
	Eating healthily on 2 days of the week or less	Eating healthily on 3–7 days of the week	Total	
Eating healthily* on 2 days of the week or less	31 (43%)	42 (57%)	73 (100%)	0.000
Eating healthily* on 3–7 days of the week	9 (8%)	111 (92%)	120 (100%)	
Total	40 (21%)	153 (79%)	193 (100%)	

*Eating green, high-fibre and low-fat products

“If you have special [product] requests, this is also possible to order. The options are there, but just not outright available in the order list, which we have access to from the Company. For instance, if we need such a thing as spices, the quantity you have to order, compared to what we are able to use and store, does not add up.” (Chef, R&S)
“It’s hard with all the ingredients [in the cookbook ‘Food at sea’] as we do not have them, and it’s not all that we can get. When you sail out [on board the ship], it’s the one [Cook] before you, who – for the most times – ordered the food... You are left with what is there... it can be difficult to make changes.” (Untrained cook, R&S)

The use of board wages in R&S affected the food budget of some of the ships. Saved board-wages thus meant an increased pay-out sum, which was prioritized by some crews. However, for the crews sailing in especially the Norwegian sector, the food prices were higher compared to Denmark and they had difficulties staying within the food budget of the board wages.

“We pay our own food, so we also constantly have to keep an eye on our expenses. We get 83.30 kr. a day and then it depends from ship to ship how well you can manage to keep the cost down... our ship is at 65 kr. per day, which is then withdrawn from our salary.” (Chef, R&S)

“It’s fine that everyone wants us to live healthy, but if it costs us too much money, then we do not live as healthy. That’s probably the truth.” (Untrained cook, R&S)

“We discuss it [board wages] on board. If the food becomes too expensive, then the food budget is raised, however they are not entirely satisfied with that. I feel it’s a limitation that you must adhere to a certain amount per day as fruits and vegetables are incredibly expensive in Norway. Those who remained in the Danish sector have access to Danish fruit and things like that, which was cheaper, and also they could get it more often compared to us who are up here in the Norwegian sector.” (Chef, R&S)

A final challenge mentioned by the cooks in both companies was the opinion of the captain. If the captain is not in favour of the changes, it will be a major challenge for the cook to implement healthier cooking on board the ship.

“If the captain doesn’t approve the diet, it doesn’t matter what the rest thinks; it will not be served again.” (Chef, CSC)

“I tried serving those celery steaks, but the captain and the crew asked if I had fallen down from the moon, and then I was sent back in the galley to make some real food.” (Untrained cook, R&S)

CHANGES IN THE SEAFARERS’ EATING BEHAVIOUR AT 1-YEAR FOLLOW-UP

Table 3 shows a significant change in the seafarers’ self-reported eating behaviour from T1 to T2, as a greater number claimed to eat healthily on more days of the week at T2 (diet of green, high-fibre and low fat products). Fifty-seven percent of the respondents who claimed to eat healthily only 2 days a week or less ($n = 42$) at T1 thus improved their eating habits, eating healthily 3–7 days a week at T2.

DISCUSSION

The study’s findings suggest that it is possible to promote a nutritious and healthy diet at sea by way of health education provided to the professional group acting as gatekeepers of nutrition on ships: the cooks. However, structural barriers within the maritime setting prevent getting the full benefit from this learning process, which calls for additional attention from the management level. If pervasive and sustainable change is to be achieved it is not sufficient to introduce health education measures but these structures also need to be included as targets of health promotion.

SHARE KNOWLEDGE AND EXPERIENCES WITH COLLEAGUES

The chefs interviewed in our study valued the opportunity to share knowledge and experiences with colleagues, from a professional as well as a social point of view. The chefs claimed to often feel isolated in their job. This is due partly to being physically separated from the rest of the crew in the galley most of the day and partly due to being a professional minority on board with limited option for discussions with fellow colleagues. From a worksite organisation point of view, there are few opportunities for meeting up with fellow colleagues besides during crew change. However, this option was limited for R&S as crew change was done at sea. These findings suggest the management of shipping companies should prioritise for cooks to meet in order to

promote the professional exchange of ideas and knowledge about healthy diet at sea.

The majority of the untrained cooks were lacking basic knowledge about cooking and ordering of supplies. This limited the opportunity to share knowledge and experiences about cooking. Nevertheless, the cooks without professional training did still benefit from working alongside their professional colleagues and receiving their support and guidance while cooking. The task of implementing and maintaining a new cooking trend is a huge challenge, which needs to be acknowledged and addressed at management level.

COOKING IN ACCORDANCE WITH OFFICIAL RECOMMENDATIONS AND TIPS

The majority of the untrained cooks had implemented fat- and sugar-reducing techniques and were using vegetables more frequently in their daily cooking at the 1-year follow-up. The same applied for the chefs, who felt inspired by the cooking course to implement a more healthy diet. These findings are in line with the results of the self-reported eating behaviour of the seafarers, which showed a significant change in frequency of eating healthily in both companies. As shown in another section of the study, reported elsewhere, there were also significant changes in the reduction of daily sugar intake [4]. To date, there has only been 1 other intervention study within the maritime research field which tried to improve diet and eating behaviour of seafarers [14]. This study from Finland also found an improvement in the seafarers' perception of the meals prepared as being healthier at the time of the follow-up study. Taken together, these findings suggest that shipping companies should embrace and acknowledge these positive results by encouraging the cooks to maintain a light cooking trend e.g. by providing continuous training.

EXPERIENCE WITH THE “FOOD AT SEA” COOKBOOK

The “Food at Sea” cookbook was familiar to most of the participants. It was mostly the chefs from CSC, however, who had actually tried out some of the recipes before the course. In contrast, several of the untrained cooks had never heard of it before, and only a few chefs from R&S had used it. The practical task of preparing dishes from the cookbook during the course was received very positively by the participants. However, at the 1-year follow-up only a minority of the chefs and untrained cooks in R&S were using it for more than inspiration purposes. This was mainly due to lack of supply options for many of the ingredients, and also the recipes were perceived as hard to follow by the untrained cooks. Bearing in mind that the cookbook was produced for chefs, this last finding is not surprising [15]. As long as the law does not require a professional chef on board ships with

crews below 10 people [16], untrained cooks will continue to be found in the galley and in need of basic and healthy cooking training and/or a maritime ABC cookbook with very basic low-fat recipes.

AWARENESS OF COMMUNICATION STRATEGIES TO PROMOTE HEALTHY DIET AT SEA

The initial idea of implementing a healthy diet on board the ships was perceived as a major challenge by a majority of the participants, due especially to conservative food habits and traditions among the older crew members. Higher costs were another important issue raised in R&S. At the 1-year follow-up, most participants reported positive experiences with the implementation of a more healthy diet. However, most of the changes mentioned, especially by the untrained cooks, could be described as “invisible changes”, mainly in terms of the reduction of fat and sugar in well-known dishes. Few of the chefs and even fewer of the untrained cooks had introduced entirely new dishes from the cookbook “Food at Sea” on a regular basis. The majority of chefs reported cooking according to a day-by-day strategy. They either ask the crew what they favour the next day or they cook what they themselves feel like cooking, depending on the stock. Other important challenges in promoting a healthy diet on board the ships were insufficient space and storage facilities and the board wages in R&S. The latter were perceived as a particular barrier for ships sailing in the Norwegian sector, as board wages were difficult to balance due to supplies being more expensive and deliveries frequent than in the Danish sector. This means that perishable and expensive products such as fresh vegetables and fruit are ordered less. However, the board wages also appear to influence the promotion of healthy diet in the Danish sector for those ships aiming to save as much as possible on the food budget in order to maximise the payout sum. This practice influences the quality of food bought and is an involuntary incentive for unhealthy behaviour.

LIMITATIONS OF THE STUDY

The qualitative orientation of the study, using interviews with ship cooks in combination with one quantitative question on eating behaviour among the crew before and after the cooking courses is certainly adequate to explore barriers and facilitators of changing food provision in the maritime work place. However, other than a control-group-based design, this approach can only provide very tentative evidence on the effectiveness of such a health promotion intervention. Also, the use of self-reports by the cooks themselves may have led to bias due to social desirability tendencies. To limit this problem, all respondents were guaranteed anonymity and no-one gave any indication for fear of reprisals from their company. Also, critical opinions were common,

indicating that a systematic distortion of the interview data is unlikely. Nevertheless, the study lacks information on the opinion of the seafarers and the captains on the diet before and after the cooking course. Their perspective might have provided valuable knowledge about the actual change of diet – as perceived from the whole crew of the ship. In addition, the opinion of the management would have provided important knowledge as to the willingness and possibilities to target the structural challenges identified. For the quantitative data used in this study, it has to be noted that eating behaviour was assessed with only one question. More differentiated questions on eating behaviour or the use of food diaries would certainly have provided more reliable and valid information. An important limitation that should be highlighted with regard to the generalisability of findings is the homogeneity of the respondents' group, as all cooks and seafarers were Danish. However, many of the crew and cooks in the Danish merchant fleet are not from Denmark, but from countries like India and the Philippines. Therefore, the study results may not apply for foreign mixed crews.

CONCLUSIONS

From a maritime perspective, this study has provided new insights into users' perceptions of the effectiveness of a health intervention. In addition, it has highlighted the need for specially designed programmes to promote a healthy diet at sea, including professional training, and most importantly, a need to overcome the occupational challenges that this industry is faced with. A healthy diet policy encouraged at the management level should facilitate access to healthy food at sea, since there are no alternative options for the seafarers when on board. From a research perspective, new knowledge has been provided on the importance of structural conditions as potential facilitators or barriers to effects of health promotion. However, in order to improve access to a healthy and nutritious diet at sea, more knowledge is needed on the effects of interventions that aim to improve, among others, cooking skills, supply ordering skills, stock overview and storage and purchases of equipment. Being a health promoting workplace may have a positive effect on health and wellbeing, such as preventing sick leave, chronic illness and early retirement and improving psychological well-being. Further studies will be needed to evaluate nutrition-related health promotion efforts for seafarers in greater detail and in doing so also test for longer such-term outcomes. In order to fully realise the benefits of health promotion interventions, the challenges need to

be acknowledged and addressed by the companies as well as relevant maritime stakeholders.

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